



**2003 SAE Government / Industry
Meeting
Data Collection on New and Emerging
Technologies –
NHTSA's Special Crash Investigations (SCI) Program**



**John Brophy
Thomas A. Roston**

**National Highway Traffic Safety Administration
Special Crash Investigations**

May 14, 2003

Topics

- Overview of the SCI Program
- NCSA Field Data Collection Efforts
- Advanced Occupant Protection System Study
- Real World Performance of Advanced Air Bags
- Collecting Crash Data Recordings (EDRs)

Special Crash Investigations Overview



- Providing the Agency with in-depth crash investigation data since 1972
- Examines safety impact of rapidly changing technologies.
- Provides early detection of alleged or potential vehicle defects.



Special Crash Investigations Overview



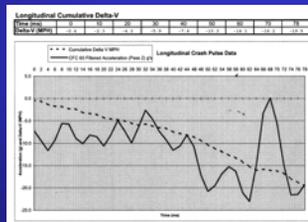
- **Priorities:**
 - Air bag related injuries / fatalities
 - Advanced occupant protection systems
 - Side air bags / curtains
 - Unusual circumstances
 - with early identification of potential problems.
- **With Emphasis on:**
 - Out-of-position occupants
 - Small statured adults
 - Children
 - Higher speed crashes (belted and unbelted)



AOPS Activities Coordination with Industry



- Working with Crash Investigators, Engineers and Designers
 - Case-by-Case Evaluation on
 - Real World Performance of the Advanced Occupant Protection (AOPS) System Technologies
 - EDR Readouts



Objectives of the Frontal Air Bag Data Collection Program



Data Collection for 2002-2003

- New Variables and Attributes in EDCS
- Notify SCI of crashes involving Certified Advanced 208 Compliant Vehicles
- Continue collecting data on vehicles equipped with Advanced Occupant Protection features



Certified Advanced 208 Compliant Vehicles



Objective:

- Provide data to the Agency that will assess the “real world” performance of these CAC vehicles involved in crashes
- Provide data to determine if they offer a greater measure of safety for children and out of position occupants while offering improved protection to adults in crashes of high severity



Certified Advanced 208 Compliant Vehicles



Research Priorities:

- **Involve a CAC Vehicle**
- **No deployment criteria**
 - Research both deployments and non-deployments



Focus on:

- System performance
- Out-of-position occupants
- Small statured adults
- Children
- Air bag related injuries



Include cases:

- **Unusual circumstances**
 - with early identification of potential problems.



Minimum Criteria for Case Selection



- 2003 or newer model year vehicle
- Certified Advanced 208 Compliant vehicle involved
- Vehicle available for inspection

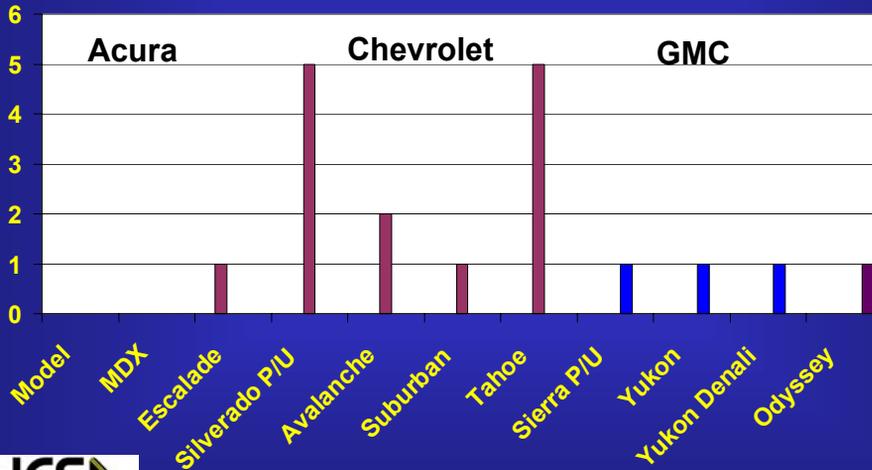


Certified Advanced 208 Compliant 2003 Vehicles

Make	Model
Acura	MDX
Cadillac	Escalade Escalade ESV
Chevrolet	Silverado P/U Avalanche Suburban Tahoe
GMC	Sierra P/U Yukon Yukon Denali
Honda	Odyssey



Cases to Date - 18 (Dropped 5 cases)



May 9, 2003

Searching for Vehicles



Working with Crash Investigators

- NASS
 - CDS
 - GES
- SCI Teams
- Law Enforcement
- FARS
- Insurance Companies
- Etc.



EDR Program at NHTSA Field Data Collection



- **NHTSA currently collects EDR crash data in three major vehicle crash programs:**
 - **NASS-CDS** – A national statistically sampled data base, currently collecting data on about 4,000 crashes each year at 27 locations around the U.S.
 - **SCI** – A collection of targeted crash investigations looking at emerging safety issues
 - **CIREN** – A system of crash investigations conducted at hospitals, collecting about 400 cases per year



EDR Program at NHTSA Field Data Collection



- **To date NHTSA has over 1100 EDR data files in the Electronic Data Collection System (EDCS)**
- **Approximately 20 files were documented via the SCI program pre-EDCS**



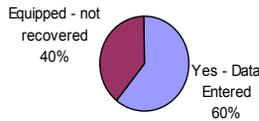
EDR Program at NHTSA: Field data collection



In the first 11 months of 2002 the NASS data collection effort was successful in downloading 60% of the applicable vehicles



NASS EDR DATA COLLECTION EFFORT
First 11 Months of 2002
684 TOTAL CASES WITH EDR EQUIPPED VEHICLES



SCI is currently working with these manufacturers to supply EDR data for SCI cases:



SCI is currently “talking” with these manufacturers to supply EDR data for SCI cases:



Sample of EDR Data Collected GM



1GCEC19TX3Zxxxxxx System Status At Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	666
Ignition Cycles At Investigation	675
Maximum SDM Recorded Velocity Change (MPH)	-6.93
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	117.5
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	35
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	0
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Time Between Near Deployment And Deployment Events (sec)	N/A
Frontal Deployment Level Event Counter	1
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No



Sample of EDR Data Collected GM (continued)

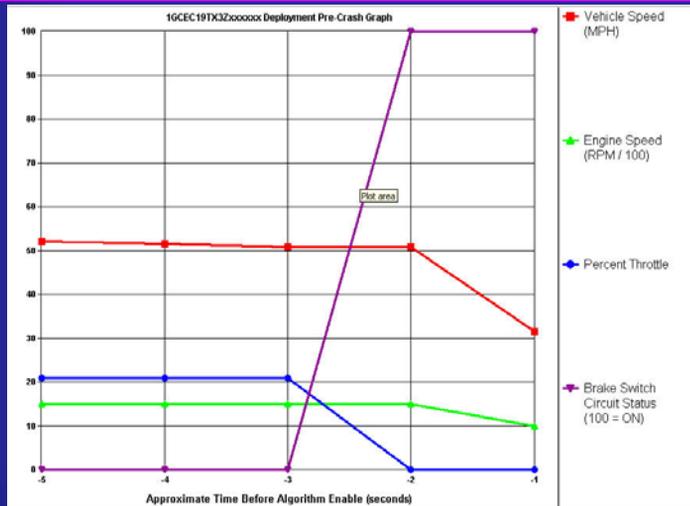


PRE-CRASH DATA				
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	52	1536	21	OFF
-4	52	1536	21	OFF
-3	51	1536	21	OFF
-2	51	1472	0	ON
-1	32	960	0	ON

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.62	-1.24	-2.48	-3.41	-4.34	-4.96	-5.27	-5.89	-6.20	-6.51	-6.51	-6.82	-6.82	N/A	N/A



Sample of EDR Data Collected GM (continued)



Sample of EDR Data Collected Ford



EDR Control Module Data

Data Validity Check:	Valid	EDR Model Version:	141
Time From Side Safing Decision to Left (Driver) Side Bag Deployment:	21		
Time From Side Safing Decision to Right (Passenger) Side Bag Deployment:	Not Deployed		
Passenger Airbag Switch Position During Event:	N/A		
Diagnostic Codes Active When Event Occurred:	0		

Algorithm Times

Actual initiation depends on restraint system status (below).

	ms
Time From Algorithm Wakeup to Pretensioner:	14
Time From Algorithm Wakeup to First Stage - Unbelted:	17
Time From Algorithm Wakeup to First Stage - Belted:	21
Time From Algorithm Wakeup to Second Stage:	0

Restraint System Status

Driver Seat Belt Buckle:	Engaged
Passenger Seat Belt Buckle:	Not Engaged
Driver Seat Track In Forward Position:	No
Passenger Seat Weight Switch Position:	N/A

Deployment Initiation Attempt Times

	Driver	Passenger
Time From Algorithm Wakeup to Pretensioner Deployment Attempt:	14	Unbelted
Time From Algorithm Wakeup to First Stage Deployment Attempt:	21	21
Time From Algorithm Wakeup to Second Stage Deployment Attempt:	Disposal	Disposal



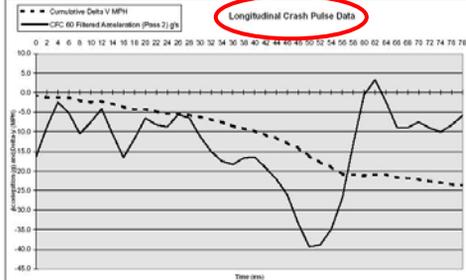
Sample of EDR Data Collected Ford (continued)



2000 Taurus/Sable EDR Report - Charts

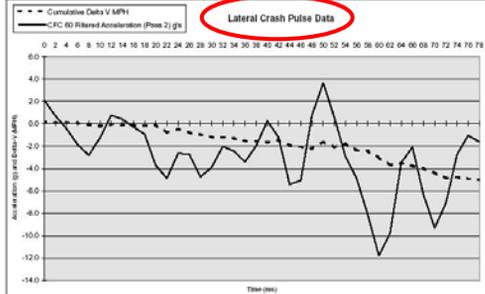
Longitudinal Cumulative Delta-V

Time (ms)	0	10	20	30	40	50	60	70	78
Delta-V (MPH)	0.4	-1.1	-4.1	-7.2	-9.4	-11.2	-13.1	-15.1	-17.1



Lateral Cumulative Delta-V

Time (ms)	0	10	20	30	40	50	60	70	78
Delta-V (MPH)	-0.1	-0.2	-0.3	-1.2	-3.7	-3.6	-3.6	-4.4	-5.8

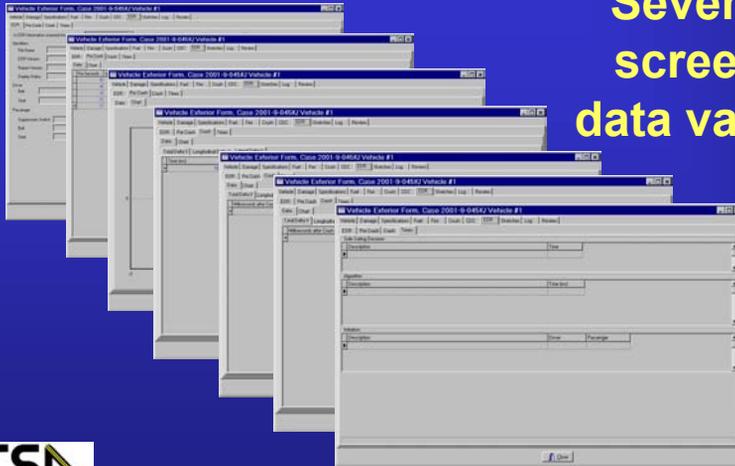


File Name: DS00-019.hox



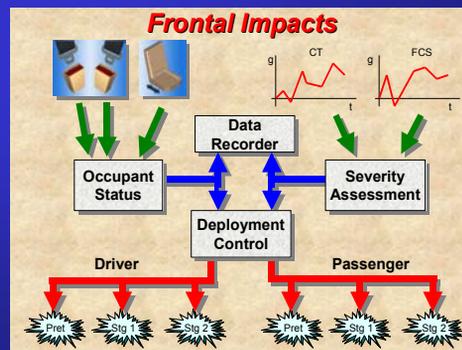
EDR Data Coding

Seven new screens of data variables



Advanced Occupant Protection Systems

The occupant restraint control module can deploy the protection systems based on several parameters, such as the crash severity, position, weight size of the occupant. **How do we know what it did and why or even if it worked correctly without an EDR?**



Questions

